REMARKS/ARGUMENTS

Applicants have amended Claims 1 and 12. No new matter was added by these amendments as these amendments are supported by the circuit disclosed in FIG. 4 of this application. Claims 1-12 remain in this application. Applicants request reconsideration of this application in view of the above amendments and these remarks and arguments.

The Examiner has rejected Claims 1-12 under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement stating that the claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. More specifically, The Examiner states "Claims 1 and 12 (as amended) include the limitation that the resonator feedback network is, 'coupled in parallel to the first variable capacitance'. However, neither the applicant's specification nor the drawings show how this limitation can be met by the invention. The applicants state in paragraph 52 of the specification that the feedback network of the Colpitts oscillator is the feedback path between emitter 460 and base 465 of transistor 450. It is also stated in paragraphs 55 and 56 that the resonator which, determines oscillation frequency, is resonator 475. It is not clear how resonator 475 is part of the feedback circuit. It is also not clear how resonator 475 may be considered to be, 'coupled in parallel to the first variable capacitance.' There is an unlabeled capacitor connected directly between first variable capacitance 425 and resonator 475. The specification does not refer to this capacitor and how it may be considered to couple elements 425 and 475 in parallel. Therefore, this limitation is addition of new matter and cannot be treated on the merits."

Applicants disagree with the Examiner for a number of reasons. First, regarding how the resonator could be considered a part of a feedback network from the emitter and base of the active device, the Examiner need only look as far as the Chong reference cited in the Final Office Action. As argued below, the Chong reference neither alone nor in combination with other references renders any of the pending claims unpatentable. More particularly, Chong discloses a voltage controlled oscillator having positive feedback from the emitter to the base of an active device. Chong states "a small portion of the amplified noise appearing at the emitter electrodes E is fed back to base electrodes B through a positive feedback path 4 [comprising an R3, R9 and

C5] *and through some of the components in the voltage controllable variable resonant circuit 2*" (col. 3, lines 49-53). Accordingly, although the apparatus claimed in Claims 1-12 of this application is different from that disclosed in Chong, the Chong reference does support the general principle that portions of a feedback network coupled between the emitter and base could comprise at least a portion of a resonant circuit (e.g., a resonator in this case).

Moreover, Applicants have further clarified the language in Claims 1 and 12 to read "a resonator that is . . . coupled in parallel to the first variable capacitance *and a capacitor in series with the first variable capacitance*". This configuration, which includes a capacitor in series with the first variable capacitance and these two elements in turn being in parallel with the resonator is clearly shown in FIG. 4 and is not, therefore, new matter. Furthermore, this configuration with a resonator coupled in parallel to a variable capacitance and series capacitor is characteristic of a Colpitts VCO configuration (*see* the underlined text and circled circuit portion in the attached APN1012 describing a "Fundamental Low Noise Colpitts VCO").

The Examiner has further rejected Claims 1-5, 9 and 12 under 35 U.S.C. 102(b) as being anticipated by Chong (USPN 6,075,421). Applicants traverse these rejections. As amended, the configuration of the first and second variable capacitances recited in Claims 1 and 12 is different from the configuration of the varactors VR1 and VR2 disclosed in the Chong reference. Amended Claims 1 and 12 now recite that "the second variable capacitance is coupled in series between the resonator and the active device and *is not directly connected to the first variable capacitance*". Such limitations are not disclosed in Chong, as Chong states and discloses in FIG. 1 that VR1 and VR2 have a "common node [that] is the cathode electrode of each varactor, these electrodes being directly coupled to each other" (col. 3, lines 13-15).

For these reasons, Applicants submit that the Chong reference does not anticipate Claims 1-5, 9 and 12 and that these claims are, therefore, in a condition for allowance.

The Examiner has further rejected: Claims 6 and 7 under 35 U.S.C. 103(a) as being unpatentable over Chong in view of DaSilva (USPN 4,939,481); Claim 8 under 35 U.S.C. 103(a) as being unpatentable over Chong in view of Kitamura, et al. (USPN 6,906,596); Claim 10 under 35 U.S.C. 103(a) as being unpatentable over Chong in view of Grube, et al. (USPN 5,987,331) in further view of Eban (USPN 6,218,909); and Claim 11 under 35 U.S.C. 103(a) as being unpatentable over Chong in view of Grube, et al. (USPN 5,987,331). Applicants traverse all of

these rejections. Similar to the Chong reference, none of these additionally cited references (DaSilva, Kitamura, et al., Grube, et al, and Eban) disclose the limitations recited in Claim 1 and included by dependency in Claims 6-8 and 10-11 of "the second variable capacitance is coupled in series between the resonator and the active device and is not directly connected to the first variable capacitance".

For these reasons, Applicants submit that no combination of the Chong, DaSilva, Kitamura, et al., Grube, et al, and Eban references renders Claims 6-8 and 10-11 unpatentable and that these claims are, therefore, in a condition for allowance.

The Applicants believe that the subject application, as amended, is in condition for allowance. Such action is earnestly solicited by the Applicants.

In the event that the Examiner deems the present application non-allowable, it is requested that the Examiner telephone the Applicant's attorney or agent at the number indicated below so that the prosecution of the present case may be advanced by the clarification of any continuing rejection.

Please charge any fees that may be due to Deposit Account 502117, Motorola, Inc.

Respectfully submitted,

By:

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Attachments

Fundamental Low Noise Colpitts VCO

The characteristic feature of the Colpitts VCO is that it uses a capacitive divider for the feedback consisting of C_1 and C_2, and an inductive branch including a parallel resonator and series capacitor C_3. The parallel resonator includes inductive element M_1 (that may be a discrete inductor for lower frequencies or a length of micro-strip line for RF) and a capacitive branch, consisting of a varactor and a series capacitor(s). The entire inductive branch should have inductive impedance at the frequency of oscillation, otherwise there will be no oscillation. This means that the resonant frequency should be higher than the oscillation frequency.

Note that the resonator current circulates through the varactor, series capacitor C_{11} and inductor M_1 and is the largest current in the tank circuit. Because of this, losses introduced in this current path are the crucial ones with respect to phase noise.

Without delving deeply into phase noise theory, we note that phase noise is inversely proportional to the power bypassed through the feedback loop, and the loaded Q of the tank circuit. Thus, the more power lost on the way to the transistor base, the higher the noise. It is clear that varactor loss plays a crucial role in the phase noise property of the VCO. If phase noise is an issue, the varactor series resistance should be carefully considered.

There is an additional concern because phase noise is not only a function of varactor loss. The varactor capacitance voltage characteristic has a crucial impact on phase noise as well. With a higher capacitance ratio, the varactor's coupling to the resonator is reduced resulting in lower resonator current. Therefore, a hyperabrupt varactor having higher series resistance is often a better choice than a lower capacitance ratio abrupt varactor having lower series resistance.

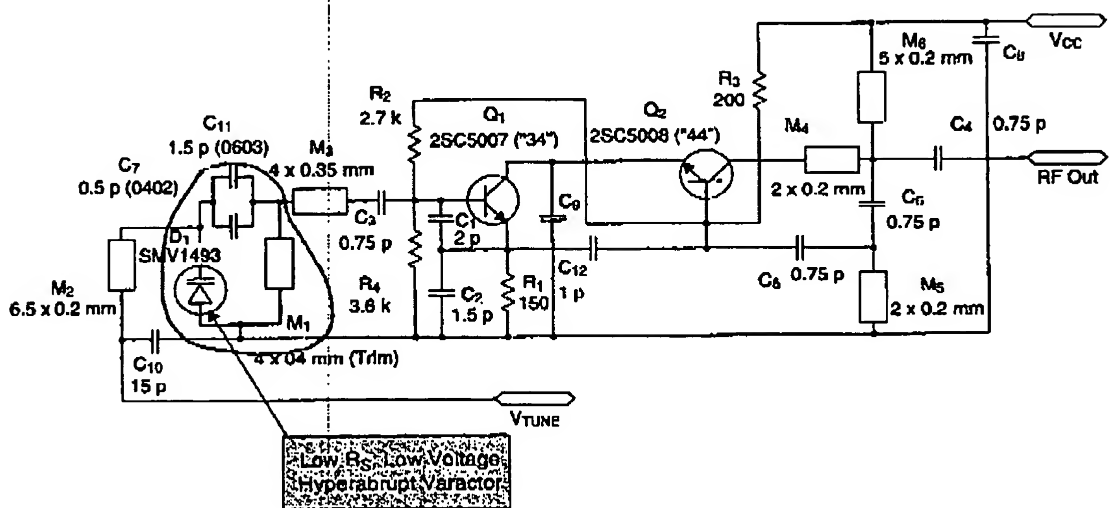

Figure 2. Low Noise High Performance Colpitts VCO

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